What is Claimed is:

Sub a1

1. An iris image capture device having an expanded capture volume comprising:

15

two lens systems comprising:

a first lens system; and

a second lens system;

wherein said first lens system and said second lens system are offset from one another in one or more of a X-axis, a Y-axis, and a Z-axis and arranged to capture an iris image of at least one of a left eye and a right eye;

18

two illuminators comprising:

a first illuminator positioned outboard of said second lens system; and

a second illuminator positioned outboard of said first lens system;

wherein said first illuminator and said second illuminator are offset from one another in one or more of a X-axis, a Y-axis, and a Z-axis for illuminating an iris of said at least one of said left eye and said right eye,

wherein said first lens system operates with said first illuminator and said second lens system operates with said second illuminator to illuminate an iris of an eye and capture an image of said iris.

2. The device of claim 1, further comprising an expanded apparent capture volume defined by dimensions X, Y, and Z, wherein said expanded capture volume is formed by extending a dimension of said capture volume in one or more of said X-axis, said Y-axis, and said Z-axis.

3. The device of claim 1, wherein:

said first lens system and said second lens system are horizontally offset from one another in an X-axis a known distance corresponding to an average eye separation;

said first lens system and said first illuminator are horizontally offset from one another in said X-axis and are positioned relative to one another having a known separation; and

said second lens system and said second illuminator are horizontally offset from one another in said X-axis and are positioned relative to one another having a known separation.

4. The device of claim 3, wherein said known distance corresponding to an average eye separation ensures that said first lens system is on-axis with said left eye and said second lens system is on-axis with said right eye when a user is positioned directly in front of said iris image capture device.

5. The device of claim 1, further comprising an expanded apparent capture volume of said iris image capture device formed along an X-axis by extending an apparent width of field along a X-axis by positioning said illuminators outboard of said lens systems and allowing each of said lens systems to capture an iris image of either or both of said left eye and said right eye.

6. The device of claim 1, further comprising:

a maximum apparent width of field that extends in said X-axis, wherein said maximum apparent width of field comprises:

a distance in said X-axis between:

a maximum right position where a left iris inner boundary is located juxtaposition a right FOV outer boundary wherein an image of a left iris can be captured in said right FOV when a user's head is shifted to the right;

a maximum left position where a right iris inner boundary is located juxtaposition a left FOV outer boundary wherein an image of a right iris can be captured in said left FOV when the user's head is shifted to the left.

7. The device of claim 1, further comprising an expanded apparent capture volume of said iris image capture device formed along a Z-axis by extending an apparent depth of field by offsetting said depth of field of each lens system from one another.

8. The device of claim 7, wherein said offset of said depth of field of each lens system is accomplished by physically offsetting each lens system from one another in said Z-axis.

9. The device of claim 7, wherein said offset of said depth of field of each lens system is accomplished by optically offsetting each lens system from one another.

10. The device of claim 9, wherein said optical offset of each lens system is accomplished by using lens systems having different lens prescriptions.

11. The device of claim 1, further comprising a third lens system and a third illuminator that are vertically offset in a Y-axis from said first lens system, said second lens system, said first illuminator, and said second illuminator to form an apparent expanded capture volume along a Y-axis.

12. The device of claim 11, further comprising an expanded apparent capture volume of said iris image capture device formed along said Y-axis by extending an apparent height of field by offsetting said height of field of each lens system from one another.

13. The device of claim 1, further comprising a tilt mechanism for rotating said lens systems up and down.

14. The device of claim 1, further comprising a pan mechanism for rotating said lens systems left and right.

15. The device of claim 1, further comprising an autofocus feature for focusing said lens systems on an iris of an eye of a user.

16. The device of claim 1, further comprising a user interface, wherein said user interface assists a user in positioning him or herself with respect to said iris imaging device in X, Y, Z coordinates.

17. The device of claim 16, wherein said user interface further comprising one or more of a visual indicator and an audio indicator.

18. The device of claim 16, wherein said user interface further comprising a partially silvered mirror for selectively viewing one of a reflection of said eyes reflecting off of said partially silvered mirror and a graphic display positioned behind said partially silvered mirror and projected through said partially silvered mirror.

19. The device of claim 18, wherein,

said lens systems are horizontally offset from one another a distance in said X-axis a distance corresponding to an average eye separation;

a horizontal dimension of said partially silvered mirror is extended beyond an axis of said lens systems; and

said lens systems are positioned behind said partially silvered mirror to further improve ease of use.

20. The device of claim 19, further comprising apertures in said partially silvered mirror along an axis of each of said lens systems for allowing illumination to pass through said partially silvered mirror and enter said lens systems to capture an image of an iris of an eye of said user through said partially silvered mirror.

21. The device of claim 1, further comprising:

a camera processor (ASIC) for controlling the operation of a sensor and optics of each of said first and second lens systems; and

a micro-controller for controlling the operation of said first and second lens systems and an illumination circuitry of each of said first and second illuminators.

22. The device of claim 1, further comprising:

a separation defined by a distance in said X-axis between each lens systems and its corresponding illuminator;

a distance between a front of said lens system and an eye of a user of said iris image capture device; and

a minimum angular separation defined by an angle formed between a line extending along an illumination axis and a line extending along a lens system axis, wherein said minimum angular separation ensures no reflections due to eyeglasses fall within an iris image area.

23. The device of claim 22, wherein said minimum angular separation comprises an angle of about 11.3 degrees.

24. The device of claim 1, further comprising a minimum angular separation defined by a line of sight between said illuminator and an eyeglass lens and a line of sight between said eyeglass lens and a lens of said lens system, wherein said minimum angular separation comprises an angle of about 11.3 degrees.

25. The device of claim 1, wherein said first illuminator is positioned with respect to said first lens system, and said second illuminator is positioned with respect to said second lens system a distance apart from one another which ensures a minimum angular separation of about 11.3 degrees.

26. The device of claim 1, further comprising a Wide Field Of View (WFOV) camera for locating a position of an eye of a user, wherein an output from said WFOV camera is used to control one or more of a tilt mechanism and a pan mechanism.

27. A system for imaging an area of an object positioned behind a light transmissive structure using an illuminator that produce specular reflections on said light transmissive structure comprising:

a single lens system having a sensor for capturing an image of said object behind said light transmissive structure;

a single illuminator positioned having a known separation from said lens system;

an object distance between said lens system and said object to be imaged; and

a minimum angular separation defined an angle formed between an illumination axis and a lens system axis, wherein said minimum angular separation ensures that no specular reflections fall onto an area of an object to be imaged.

28. The system of claim 27, wherein said minimum angular separation comprises an angle of about 11.3 degrees.

29. The system of claim 27, wherein said illumination axis is defined by a line between said illuminator and said light transmissive structure and said lens system axis is defined by a line between said light transmissive structure and said lens system.

30. The system of claim 27, wherein said minimum angular separation is ensured by manipulating said separation between said lens system and said illuminator and said object distance between said lens system and said object to be imaged.

31. The system of claim 27, wherein said separation between said lens system and said illuminator varies between about 1.2 inches and about 5.2 inches and said object distance between said lens system and said object to be imaged varies between about 6 inches and about 26 inches.

32. The system of claim 27, wherein said object to be imaged is positioned directly in front of said lens system.

33. A method for imaging an area of an object positioned behind a light transmissive structure using illuminators which produce specular reflections on said light transmissive structure while avoiding specular reflections from falling onto said area of said object to be imaged, said method comprising:

providing a first lens system;

providing a second lens system positioned a predetermined distance from said first lens system;

providing a first illuminator positioned outboard of said second lens system for operating with said first lens system to capture an image of either a left eye or a right eye;

providing a second illuminator positioned outboard of said first lens system for operating with said second lens system to capture an image of either a left eye or a right eye;

separating said first illuminator from said first lens system a distance apart from one another to ensure a minimum angular separation so that no reflections due to eyeglasses fall within an iris image area;

separating said second illuminator from said second lens system a distance apart from one another to ensure a minimum angular separation so that no reflections due to eyeglasses fall within an iris image area;

illuminating said area with said first illuminator and checking to see if said first illuminator has produced a specular reflection that obscures said area of said object;

if said first illuminator has produced a specular reflection that obscures said area of said object then illuminating said area with said second illuminator;

obtaining an image of said area while said first illuminator is on using said first imager if said first illuminator has produced a specular reflection that has not obscured said area; and

obtaining an image of said area while said second illuminator is on using said second imager if said first illuminator has produced a specular reflection that has obscured said area.

34. The method of claim 33, wherein said step of separating said first illuminator from said first lens and said step of separating said second illuminator from said second lens system further comprise the step of ensuring a minimum angular separation of about 11.3 degrees.

35. The method of claim 33, further comprising the step of expanding an apparent capture volume defined by dimensions X, Y, and Z, wherein said expanded capture volume is formed by extending a dimension of said capture volume in one or more of said X-axis, said Y-axis, and said Z-axis.

36. The method of claim 35, wherein the step of expanding an apparent capture volume further comprises the steps of:

expanding said apparent capture volume along an X-axis by,

extending an apparent width of field along a X-axis by,

positioning said illuminators outboard of said lens systems, and

capturing an iris image of either or both of said left eye and said right eye using either of said lens systems.

37. The method of claim 36, further comprising the steps of:

extending said apparent width of field to a maximum distance in said X-axis by:

positioning a left iris inner boundary juxtaposition a right FOV outer boundary defining a maximum right position

capturing an image of a left iris in said right FOV when a user's head is shifted to the right; and

positioning a right iris inner boundary juxtaposition a left FOV outer boundary defining a maximum left position;

capturing an image of a right iris in said left FOV when the user's head is shifted to the left.

38. The method of claim 35, wherein the step of expanding an apparent capture volume further comprises the steps of:

expanding said apparent capture volume along a Z-axis by,

extending an apparent depth of field by,

offsetting said depth of field of each lens system from one another, and

capturing an iris image of either or both of said left eye and said right eye using either of said lens systems.

39. The method of claim 38, wherein said step of offsetting of said depth of field of each lens system further comprises the step of physically offsetting each lens system from one another in said Z-axis.

40. The method of claim 38, wherein said step of offsetting said depth of field of each lens system further comprises the step of offsetting one or more optical properties of each lens system from one another.

41. The method of claim 39, wherein said step of offsetting said one or more optical properties further comprises the step of offsetting a focal length of each lens system from one another.

42. The method of claim 33, further comprising the steps of:

providing a user interface having a feedback mechanism; and

feeding back information indicative of a user position, wherein said user interface assists a user in positioning him or herself with respect to said iris imaging device in X, Y, Z coordinates.

43. The method of claim 42, wherein said step of feeding back information further comprises the step of selectively displaying viewing one of:

a reflection of said eyes reflecting off of a partially silvered mirror; and

a graphic display projected through said partially silvered mirror.